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DISCUSSION PAPERS

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Economic Growth and the Income of the Poor

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Abstract

This paper investigates the relationships between economic growth and the incomes of the poor in three steps. In the first part of the paper, the authors examine whether the average income of the poor tends to grow at the same rate as overall per capita income. Second, they examine the extent to which other factors influence the income of the poor, after controlling for overall economic growth.. Specifically they analyze the extent to which initial income distribution, population, and policies in health and education affect the growth of the income share of the poor, or, stated differently, what affects the income of the poor *over and above* the impact of aggregate economic growth. The third part of the paper examines the *direct* impact of structural and policy variables on the incomes of the poor, without controlling for overall economic growth.

The paper finds a strong relationship between overall income growth and the income of the poor. Specifically, the average income of the poor tends to grow proportionately to the average income of the entire population. On average across countries, an economic growth rate of 2.8 percent is associated with a 2.8 percent growth rate of the income of the poor. Of course, this one-to-one relationship does not hold in all economies, and in some cases the incomes of the poor grow either faster or slower than that of the overall population. The paper then identifies certain characteristics that appear to be common to countries in which income distribution changes as overall income rises.

1. Introduction

What is the relationship between economic growth and the income of the poor? Development specialists have debated for decades the relative importance of overall economic growth, economic policies, social policies, and aid programs for influencing the income of the poor. One widely held view has been that economic growth does not reach the poor as fully as it does other members of society. At least in part, this notion is based on a hypothesis originally sketched out by Simon Kuznets (1955) that income distribution tends to worsen at early stages of development, and only later improve as incomes rise. If there is indeed such a law of development, it suggests that the growth-oriented policies pursued by many developing countries during the last decade may leave the poor behind.

The Kuznets hypothesis was derived from a very stylized model of a developing country with just two sectors: agriculture and industry. If all that happens during the development process is that poorer farmers migrate from low-income agriculture to high-income industrial jobs, then it is inevitable that income dispersion will at first rise and then fall. Moreover, income inequality will rise at first even though no individual is getting worse off in absolute terms. This is an important insight, but since of course many other things happen in the development process, it is not necessarily the case that the "Kuznets curve" will be the dominant tendency. Indeed, so far the evidence is not obviously supportive and probably goes against this hypothesis (see, for example, Deininger and Squire, 1996a). Still others argue that even if the Kuznets hypothesis proves correct, overall economic growth remains one of the few successful anti-poverty programs recorded in world history, and we would be foolish to downplay its accomplishments, even as we search for better remedies. On this view, the important thing for poverty reduction is whether the income of poorer people is rising, not necessarily whether income distribution is improving.

To clarify these issues, it is worth discussing what is meant by the phrase "leaving the poor behind." Let's take the African island nation of Mauritius as an example. In 1980, the average income for someone in the bottom twenty percent of the income distribution in Mauritius was 1,410 U.S. dollars.[2] By 1991, the average was $1,996 per year. During the same period average GDP per person went from $3,988 to $5,959. So several statements are correct about Mauritius. First, Mauritius had substantial per capita economic growth (3.7 percent per year). Second, the average real income of the poor increased by 3.2 percent per year. Finally, income inequality increased, since the growth rate of the poor lagged behind overall per capita growth. The income share of the bottom twenty-percent declined from 7.1 to 6.7 percent. Therefore, growth did not leave the poor behind in the sense of lowering their real income (their income rose by 41 percent), but it did leave the poor behind in the sense that their income rose less rapidly than that of the rest of society.

The ideas in the preceding paragraph can be clarified further by looking at the mathematical relationship between three concepts, the average income of the poor, the income share of the

[2] This income figure and the others discussed throughout the paper are expressed as purchasing-power-parity Gross Domestic Product (GDP) per capita in constant 1990 U.S. dollars. We use "income" and "GDP per capita" interchangeably.

poor, and overall per capita income. Defining "poor" as the poorest 20 percent of the population, these three concepts are related as follows.

$$Yp=(Sp/0.2)*Y$$

In this equation, Yp is the real income per capita of the bottom 20 percent, Sp is the income share of the bottom twenty percent, and Y is per capita income of the entire society. From this equation, it can be shown that the growth rates will be additive:

$$\text{Growth}(Yp) = \text{Growth}(Sp) + \text{Growth}(Y) \tag{1}$$

In other words, the growth rate of the income of the poor is equal to the growth rate of the share of the poor's income plus the growth rate of the average income of the poor. This equation tells us that examining whether the income share is changing is equivalent to examining whether the average income of the poor tends to grow faster or slower than average income of the overall society.

The debate on the relationship between economic growth and the income of the poor generally has been based on individual case studies and the experiences of a few countries. More extensive statistical research has been hampered by the lack of reliable and comparable data on income shares and income distribution across a large number of countries. However, a new data set compiled by Klaus Deininger and Lyn Squire (Deininger and Squire, 1996b) represents a major step forward in this direction, and allows more systematic research into these questions.

The average income of the poor is a "relative" measure of poverty: it measures the economic wellbeing of the people who are poor relative to the income earned by others in the same country (the poor are the poorest 20 percent). By this measure, the poor in a rich country will be richer than the poor in a poor country. An alternative is to use an "absolute" measure of poverty: to calculate the income needed for a minimum level of wellbeing, however the minimum may be defined, that is the same across all countries rich and poor. The main reason we prefer a relative measure of poverty is that we want to investigate whether the poorer citizens of any given country share in economic growth. If we distinguish the poor from the non-poor according to an absolute income level across countries, virtually everyone in the poorest countries would be classified as poor and virtually no one in the richest countries would be poor. By such a definition of poverty, the poor would automatically benefit from average income growth in the poorest countries, and the poor would be largely untouched by growth in the richest countries (or they would soon cease to be poor). In fact, the income levels chosen by governments to define "absolute" poverty within their own countries are low for poor countries and much higher for rich countries, suggesting that poverty is generally perceived relative to the income level of each country. The other reason for using a relative poverty measure is that we now have good time-series data on relative poverty, whereas there are very few comparable data on absolute poverty across countries over time.[3]

[3] For analysis of the relationship of poverty and growth using the limited data available on absolute poverty, see Squire (1993) and Ravallion and Chen (1996).

This paper investigates the relationships between economic growth and the incomes of the poor in three steps. In the first part of the paper, we examine whether the average income of the poor tends to grow at the same rate as overall per capita income. This part of the analysis extends the earlier research in this direction by Deininger and Squire (1996a) and Roemer andGugerty (1997).[4] From the equation above, this is equivalent to asking whether income distribution (the Sp term) tends to change as income grows on average across countries. Second, we then examine the extent to which other factors influence the income of the poor, after controlling for overall economic growth. This is essentially equivalent to examining the extent to which these other variables affect income distribution (Sp). Specifically we analyze the extent to which initial income distribution, population, and policies in health and education affect the growth of the income share of the poor, or, stated differently, what affects the income of the poor *over and above* the impact of aggregate economic growth. Previous research has examined the extent to which these factors influence *aggregate* economic growth. We know, for example, that better health is associated with faster economic growth, which may raise the incomes of the poor. We extend this analysis one step by exploring whether there is a disproportionate benefit to the poor, beyond the effect of overall economic growth.

The third part of the paper examines the*direct* impact of structural and policy variables on the incomes of the poor, without controlling for overall economic growth. In this section, we draw on the growing body of literature that examines the determinants of economic growth across countries. This approach allows us to examine the extent to which trade openness or location in the tropics, for example, directly influences the growth of the incomes of the poor. Since we can also examine how these variables affect overall growth, we can observe the differential impact of these policies and structural characteristics on the growth rates of the income of the poor and per capita income. This provides us with another perspective on the relationship between these variables and income distribution.

The paper finds a strong relationship between overall income growth and the income of the poor. Specifically, we find that the average income of the poor tends to grow proportionately to the average income of the entire population. In other words, the Mauritius example cited above, where the real income of the poor grew at 3.2 percent and that of the entire population grew at 3.7 percent is not typical. On average across countries, an economic growth rate of 2.8 percent is associated with a 2.8 percent growth rate of the income of the poor.[5] Of course, this one-to-one relationship does not hold in all economies, and in some cases the incomes of the poor grow either faster or slower than that of the overall population (as in Mauritius). The paper then identifies certain characteristics that appear to be common to countries in which income distribution changes as overall income rises. For example, we find the growth rates of the income of the poor tend to be faster in countries with initially unequal income distributions, and slower in countries with initially good income distribution. Political instability, lax government

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[4] There is a large empirical literature examining the relationships of poverty, inequality, and economic growth, but the income distribution data available before Deininger and Squire' s compilation included so few countries and so few time periods that the results often depended on what countries were included in the sample. Ahluwalia' s influencial 1974 paper, for example, anticipates some of our results on growth and poverty, but with a sample of only 13 developing countries. Fields (1983) surveys the early literature.

[5] As explained below, when the economy grows at less than 2.8 percent per person, the income of the poor tends to grow slightly slower than the overall economy, and when the economy grows faster than 2.8 percent per person, the income of the poor tends to grow slightly faster than the overall economy.

budget policies, and location in the tropics are also associated with deterioration in income distribution.

The analysis proceeds as follows. Section 2 briefly describes our data and their limitations. Section 3 explores the relationship between economic growth and the incomes of the poor. Section 4 looks at the direct relationships between structural and policy variables and the growth of the income of the poor. Section 5 offers some concluding comments.

2. Poverty Data Sources and Coverage

The Deininger and Squire (1996b) income distribution data set allows us to address the relationship between poverty and economic growth in a large number of developing countries for the first time. This data set includes income shares by quintile for multiple periods for sixty-four countries. We have updated the Deininger and Squire data set with more recent observations (from World Bank, 1998, Annex Table 2.8) to provide multiple periods for sixty-nine countries. We combine these share data with data on overall GDP per capita, adjusted for purchasing power parity (PPP), drawn from the Penn World Tables (Summers and Heston 1995, 1991), and updated with PPP estimates of GDP per capita growth from the World Bank (1998). This allows us to calculate the average income level of the poorest quintile (the poorest 20 percent of the population) in each country over time, and the corresponding income growth rate, for these 69 countries.

Deininger and Squire compiled data from every study they could find with national coverage of income distribution that had been conducted during the last forty years. They evaluated these studies and extracted from this universe the subset of what they considered to be "high quality" observations on income distribution. They required these observations to be based on household surveys, comprehensive coverage of the population, and comprehensive coverage of income or expenditure sources. The result is the first comparable data on income distribution for a large number of countries over time.

Although these data are the best available, they are far from perfect. The underlying data were compiled using somewhat different methodologies across countries and over time. Observations vary in measuring income or expenditure, and by individuals or households as the unit of observation. Even in the "high quality" data, there are likely to be large measurement errors and some clearly questionable observations. The number of observations varies widely by country, so the sample is unbalanced. In addition, it is worthwhile pointing out that when we examine the average income of the poorest quintile over time, we are not looking at the same individuals at all points in time. Some individuals achieve rapid income growth and move out of the bottom quintile, and others who start in a higher income bracket may experience slower income growth and shift into the bottom income quintile. The data do not allow us to track individuals over time; rather, the data allow us to calculate the average income for those who happen to be in the low-income quintile at any point in time. Finally, although the Penn World Tables are undoubtedly the best cross-country income data available, they too contain errors. In summary, these data provide useful insights, but the conclusions should be viewed with some caution. In particular, we focus on the broad patterns across countries over time, rather than the trends in any one country. With 69 countries in the sample, many countries are missing. Some geographical regions, especially Africa and the Middle East, are substantially under-represented because of lack of reliable data on income shares of the poor. Despite these caveats, we believe the data is of sufficiently high quality to provide useful insights. These data represent most of what is known about general trends in poverty around the world.

3. The Relationship Between Economic Growth and the Incomes of the Poor

Income Levels

In all regions of the world, the higher the GDP per capita, the higher the income of the poor (Figure 1). The relationship between average income levels and the income levels of the poorest 20 percent is remarkably similar between poor and rich countries. The fitted trend between average income levels and the income of the poor in Figure 1 (which is displayed with logarithmic scales) shows that countries with one percent higher average incomes on average have exactly one percent higher incomes of the poor.[6] In both poor and rich countries, poor people within a particular country earn about one-third the income level of the average person.[7] This overall average varies somewhat by region. In African and Latin American countries, the poor tend to receive a somewhat smaller share of income (most of the observations are below the fitted line). In most Asian and Eastern European countries the poor have a somewhat larger share (above the fitted line; almost all of the Eastern European observations are from before the breakup of the Soviet Union).

Differences in levels of income across countries are partly due to the consequences of history, geography, cultural factors, etc. which are particular to individual countries and hard to take into account in analysis. Because of these factors, the difference between poor and rich countries does not necessarily tell us what will happen within a country as it gets richer. The typical change over time within countries is a more revealing indicator of what may happen in the future. In Figure 1, multiple observations for each country are connected by lines, so it is possible to see that for most countries the changes over time are similar to the cross-sectional pattern of countries at different income levels.

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[6] In a recent paper, Peter Timmer (Timmer, 1997) found less than a one-to-one relationship between the relative level of income of the poorest 20% and average income, after accounting for country-specific intercepts and decade-specific intercepts. The coefficient for the log of average income when it was regressed on log income of the poor was 0.79, significantly less than one. Besides the intercept terms, Timmer uses a more restricted sample than we do. After a careful comparison of our results with Peter Timmer, we found that the differences were not due to differences in the sample alone nor due to the country fixed effects, but rather due to a combination of Timmer's smaller sample and decadal intercepts. In our full sample, including country and decade intercepts still results in an estimate that a one percent higher income per capita corresponds to a 0.96 percent higher income of the poor, which is not statistically different from one. The fact that in Timmer's sample the relative income of the poor is lower at higher income levels within each decade, but not across the whole period, suggests that the poor do not fully benefit from higher average incomes in the short term, but they do in the long term. Nevertheless, using the full sample below to examine the relationship of short term average income *growth* to short term income growth of the poor shows that on average, one percent of growth of average income results in one percent of growth of incomes of the poor.

[7] From the regression line reported in Figure 1, $Yp/Y = \exp(-1.12) = 0.326$.

Income Growth Rates

Due to the limitations of level regressions for studying change over time we analyze the growth rates of the income of the poor and per capita income in the rest of the paper. We organize the data on growth rates in two different ways. First we look at rates over as long a period as possible, yielding one observation for each country, which we call the long panel. Second, we examine growth rates between every pair of observations available for a country, yielding several shorter growth episodes for most countries, which we call the short panel.

The time span of the long panel depends on the availability of income distribution data. Since these data are recorded for different years in different countries, the time period under observation differs across countries, though in most cases the period runs from the late 1960s to around 1990. We exclude countries with data for less than a ten-year period, which leaves us with 60 countries having an average growth span of 19 years.[8] A list of the countries included, and the dates of the first and last observation, is shown in Table 1. As noted above, many key countries are missing, especially in Africa and the Middle East. Income distribution data over time are simply not available for most countries in these regions. Since many of these countries are among the poorest and slowest growing in the world, we must take care in generalizing our conclusions.

The short panel includes 488 growth episodes for 69 countries (including the countries whose data does not span ten years). The average growth span is 2.7 years. The geographical coverage is improved, including eleven countries in Africa, but the data are for short-run variations. Countries with more frequently measured income distribution are more heavily represented in the short panel, so for example India with annual data for most of the years from 1951 to 1994 has 31 observations, but Zambia with data only for 1976 and 1991 has one growth period observation. Since our interest is primarily in the long-term relationship of poverty and growth, rather than short-term fluctuations, we will focus the analysis on the long panel.

Regional averages of income growth of the poorest 20 percent and average income growth from the long panel are shown in Table 2. For several of the regions, the number of countries with data is small enough that the averages should be taken as examples of countries in the region rather than an estimate of the region's characteristics. The countries with the highest income growth of the poor by far are in East and Southeast Asia, where growth averaged 4.5% per year over periods of about 20 years. Income of the poor in these countries was about two and a half times higher at the end of the period than it was at the beginning. At the opposite extreme are the three Sub-Saharan African countries where incomes of the poor *contracted* by 1.1% per year. This implies that over a twenty-year period the poor in these countries ended up with only 80% of the income they started out with.

[8] To minimize the effect of idiosyncrasies in the endpoint observations, we use the trend growth rate over time for all countries with more than two observations (53 of the 60). The trend is estimated by regressing the log of income on time, with the estimated slope yielding the average growth rate. This method uses all of the observations available for a country rather than just the endpoints. For consistency, we also use predicted rather than measured initial income levels (overall and for the poor) when initial levels are used in the analysis. Use of the trend rather than the endpoint growth rates causes the trend values for Mauritius in Table 1 to differ slightly from the endpoint values discussed in the introduction.

On average across all countries, the income of the poor grew almost as fast as overall income. Across all regions general income growth was only 0.1% faster than the income growth of the poor (the difference between the two is in the fourth column of Table 2). Between regions, there was substantial variation with the income of the poor in Sub-Saharan Africa countries growing at 0.9 percent slower than the whole population, and 1.5 percent faster in Middle Eastern and North African countries. Importantly, though, there does not seem to be any tendency for the poor' s income growth to lag behind average growth more in faster growing regions. If anything, the poor' s income lagged behind the average most in the slowest growing regions.

Country data on income growth rates of the poor and the average from the long panel are plotted in Figure 2. The diagonal line that goes through the origin is the line on which average income growth is equal to income growth of the poor. The plotted data are quite close to this one-to-one relationship. The first column of Table 3 presents a regression estimate of the relationship between overall growth and income growth of the poor.[9] The estimated coefficient is slightly *greater* than one (1.17), meaning that when growth in per capita income increases by one percentage point, the growth rate of the income of the poor increases by slightly *more* than one percentage point. The straight line in Figure 2 that is slightly steeper than the diagonal through the origin is the fitted line from the regression in Table 2. Taking into account the negative intercept in the regression (though statistically indistinguishable from zero), the poor' s income is estimated to grow slower than overall growth for overall growth rates below 2.8% and faster than overall growth above 2.8%. This estimated one-to-one relationship confirms the findings of Roemer and Gugerty (1997) using an updated sample. It is also consistent with Deininger and Squire' s (1996a) finding that income distribution changes little over time in most countries, since a worsening income distribution (with respect to the poor) would require that the poor' s income grows slower than overall incomes.

Several countries that are outliers in the data are identified by country codes in Figure 2. These countries do not have a substantial impact on the estimated relationship of poor and overall income growth, though. When these data points are excluded, the estimated correlation between the growth rates is 1.03 with a constant term of –0.11 (regression not shown). The majority of individual countries have similar growth rates for income overall and of the poor. The exceptions to this trend, where the poor' s income has grown at least 2% slower than the average, are Guatemala, Sierra Leone, and China. These countries are balanced by six countries where

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[9] It may seem nonsensical to *estimate* the relationship between income growth of the poor and average income growth when equation (1) above shows that the income growth of the poor is identically equal to average income growth plus the growth in the income share of the poor. However, implicit in the notion that overall economic growth may not reach the poor is that the share of income to the poor changes as a result of overall growth. In other words, s = Growth(Sp) is a function of y = Growth(Y). Suppose that $s = qy + s^e$ where q is a constant and s^e is the exogenous change in the income share of the poor not related to average income growth. If i denotes data from country i, and p = Growth(Yp), then $p_i = y_i + s_i = (1+q)y_i + s_i^e = a + by_i + e_i$, where $a = \bar{s}^e$, $b = 1+q$, $e_i = s_i^e - \bar{s}^e$, and $\bar{s}^e$ denotes the cross-country average of s_i^e. a and b are parameters to be estimated, and are, respectively, the average exogenous change in the income share of the poor (which might be related to factors like the growth of health and education of the poor), and the total effect of average income growth on the income growth of the poor.

the poor' s income has grown at least 2% faster than the average: Trinidad and Tobago, Honduras, Turkey, Zambia, Jamaica, and Puerto Rico (an economy, not an independent country). In thinking about these exceptions to the overall trend, it is difficult to find common characteristics among these countries. They are diverse in terms of economic policy, income levels, geographical location, and resource endowments.

Growth and Initial Income Inequality

One factor that could plausibly affect the degree to which the poor share in economic growth is the initial income inequality. In countries where the poor receive a smaller share of income, they may be less connected to the rest of the economy, and share less in its growth. The second regression in Table 3 includes the initial income share of the poorest 20% of the population as a regressor. Contrary to expectation, in less equal countries, where the poor start with a *smaller* initial share of income, the subsequent growth rate of the income of the poor is *faster* than overall income growth. The poor appear to catch up over time in unequal countries. The estimates in Table 3 show that for a country with an income share to the poorest quintile of 3.8%, which is one standard deviation below the average of 6.2%, the poor's income will grow 0.8% faster than the economy as a whole. Since the income of the poor grows at the same rate as the whole economy on average across countries, there is no tendency for average income distribution across countries to get better or worse. However, in countries with unequal income distribution, the poor tended to catch up while in countries with more equal income distribution, the poor have tended to fall behind. There is a tendency for the share of income going to the poor to become more similar across countries as economies grow, for countries to converge towards a common income share for the poor.

This result is worth considering in more detail. Table 1 shows data on the growth of the income of the poor, overall per capita growth, the difference between these two growth rates, and initial share of income of the poor for the 60 countries in the long panel. The countries are listed in order by the size of the gap in growth rates, with those at the top of the list recording the fastest growth rate of the income of the poor, relative to overall per capita growth (shown in column 6). Note that in 31 countries – almost exactly half the sample – this gap is positive (that is, the growth rate of the income of the poor exceeds the growth rate of per capita income). In the other 29 countries, the opposite is true: the average income of the poor grows more slowly than overall per capita income. For presentation purposes, we divide the countries into three groups. In the first group of 20 countries on the list, the growth rate of the poor exceeds the rate of overall per capita growth by 0.5 percentage points or more. In the middle group of 17 countries, the growth rate of the poor is approximately equal to the overall per capita growth rate. For all the countries in this middle group, the two growth rates are within 0.5 percentage points of each other. In the third group of 23 countries, the growth rate of the income of the poor is at least 0.5 percentage points lower than growth of average income.

Two points are evident from the table. The first is the near-equal size of the three groups. There are almost exactly the same number of countries for which the incomes of the poor are growing faster than per capita incomes as there are countries where the reverse is true. Second, the countries in the first group – where the income of the poor is growing fastest – are also those that tend to have the worst initial income distribution, shown in the last column of the table. The simple average of the initial share of income of the poorest quintile in the first group is 4.9, compared with 6.5 in the second group, and 7.2 in the third group. Thus, casual observation from the table supports the results from the earlier regression. In countries with more adverse initial income distribution, the incomes of the poor tend to grow faster, and therefore income distribution improves. The opposite is true in countries with initially favorable distribution of income.

The short panel allows us to control for country specific effects and possible measurement errors in the income share data. The first regression in Table 4 repeats the estimation of the relationship of overall growth and initial income share of the poor to the income growth of the poor using the 488 observations of the short panel. The results are qualitatively the same as for the long panel: income of the poor grows faster by slightly more than one percent for every one percent higher overall growth, and the less equal the initial income share to the poor, the higher the growth of the poor. The explained variation measured by the R^2 of 0.23 is substantially lower than in the long panel indicating that these relationships do not hold as tightly in the short run as in the long run. The scatter plot of the short run data is shown in Figure 3.

Country-specific constants are included in the fixed effects estimates in the second regression of Table 4 to account for unchanging differences in the income growth of the poor due to factors we are not controlling for explicitly. The results are similar to those above except that the estimated impact of the poor’ s initial income share is much larger.

What could explain this negative relationship between initial income distribution and subsequent economic growth of the poor? Several explanations are possible, but none are fully satisfying. The first follows from the observation that in a country with an initially low share of income for the poor, the average income of the poorest quintile will be lower than in an otherwise identical country with the same average income but a better distribution. It is possible the lower incomes of the poor could create the opportunity for more rapid subsequent income growth, and thus “catching up” within a country. Poorer individuals tend to have less education and inferior health, so investments in the health or education of the poor might be expected to have higher rates of return on the margin than similar investments directed towards the rich. Regions with a concentration of poor people (e.g., isolated rural areas) may have small stocks of physical capital, so investment in physical capital (e.g., roads, power supplies) would be expected to have high rates of return.

The group of countries where the growth of the poor lagged behind overall growth in Table 1 also includes several western industrialized countries and socialist countries with initially favorable distribution. The industrial countries include the United Kingdom, the Netherlands, Portugal, New Zealand, and Denmark, and the socialist countries are the Soviet Union, Hungary, Bulgaria, and Poland. A second explanation might be that the introduction of widespread social welfare programs in these countries increased the share of income of the poor to relatively favorable levels, but the subsequent income growth of the poor lagged as these individuals did not face the same incentives found in the rest of the economy. To test the extent to which the industrialized and socialist countries were driving these results, we ran the regression with only low-income countries, and obtained approximately the same results. In the third regression in

Table 3, the relationship of economic growth and initial inequality to the income growth of the poor are if anything stronger than for the whole sample.

A third possible explanation is that the forces of globalization are leading to a convergence of income distribution through the effects on wage rates and other factor prices. A standard result of the basic Heckscher-Olin trade model is that in an open trading environment, labor-abundant, usually low-income countries will tend to export more labor-intensive goods, and high-income countries will export more skill-intensive goods. As a result, in low-income countries, wages for unskilled workers should rise relative to wages for skilled workers; leading to a more egalitarian income distribution. In high-income countries, wages for skilled workers should rise (relative to wages for unskilled workers), leading to a deterioration in income distribution. Increased migration from low-wage to high-wage economies would tend to reinforce these trends. The recent literature on the relationship between globalization and relative wage rates in low-income countries is mixed. Wood (1994) finds improved income distribution in low-income countries; Robbins (1996) and others have found the opposite. Jeffrey Williamson has found evidence of a convergence of wage rates during the last major globalization epoch between 1850 and 1914, with improved distribution in the "New World" countries and a worsening in "Old World" countries (Williamson, 1997). Our methodology does not focus directly on relative wage rates and other factor prices as a measure of inequality, so we cannot test this hypothesis directly. However, our observation of convergence in the income shares of the poorest quintile across countries is broadly consistent with this idea.

A fourth possibility is that the result is due to underlying weaknesses in the data. Errors of measurement in the income distribution data that are large in the early years and became smaller over time would yield this result. The early household surveys used to calculate income distribution may have used less appropriate methodologies, smaller samples, and less experienced interviewers than subsequent surveys. In a country with two income distribution observations, if the first estimate of the income share of the poor was too low but the second estimate was accurate, then the estimated growth of the income of the poor would necessarily be too high (because the level of income of the poor is underestimated in the first period). The opposite would be true if the first income share of the poor was overestimated – the income growth of the poor would be underestimated. In this fashion, the apparent negative effect of the initial income share of the poor on the income growth of the poor could simply be due to measurement errors that diminish over time. We can statistically correct for these measurement errors by using instrumental variables (IV) estimates, where the initial income share in one period is instrumented with the income share in the previous period. These income shares are correlated across periods, but a random error in the previous period's income share will not bias the measured growth of the income of the poor: the previous period's initial income share is uncorrelated with this period's income growth. The IV estimates in the third regression in Table 4 do reduce the size of coefficient on initial income share of poor and reduce its statistical significance to just below the 5% cutoff at 6%. Measurement errors do seem to play a role in the estimated effect of initial inequality, but higher income growth for the poor in initially unequal countries is still much more likely than the reverse.

Fifth, other important variables may be missing from the analysis that make it appear that income distribution is negatively associated with the growth of income of the poor, when it is actually something else. In the sections that follow, we add several other variables to the analysis, including health and education, government policies, geographic structure, and so on, but the negative relationship remains.

Other Variables Affecting Growth and Distribution

What else affects income growth of the poor over and above overall economic growth? One would expect that in countries that follow enlightened social policies, the poor would benefit more from economic growth. To explore this question, we look at the relationship between the poor's income growth, changes in health and education, and population growth, controlling for overall economic growth. In effect, since this specification controls for overall economic growth, it examines the effect of these variables on income distribution: that is, the extent to which these variables affect the income of the poor over and above how they might affect the overall rate of economic growth. (We drop the control on overall economic growth in the next section). Ideally, we would like to use data on the health, and education population growth, *of the poor* in each country, but these data do not exist for most countries, so we use the values for the whole population instead. The data on life expectancy and population growth are from United Nations (1996) while data on the average years of education overall, and for women, are from Barro and Lee (1993).[10]

We were startled to find that neither the population growth rate, the growth of life expectancy, nor the growth of total education and women's education has a statistically significant correlation with income growth of the poor after average income growth and initial income share are taken into account (Table 5). It is likely that some of these variables affect growth, but apparently not distribution.[11] The variable that is closest to having a statistically significant coefficient, the growth of life expectancy, has the "wrong" sign: faster improvement in life expectancy is correlated with lower income growth for the poor. We have experimented with many other related measures of population pressure, health and education, but none of these alternatives have significant correlations with the income growth of the poor, once we control for overall economic growth. Besides population growth as a measure of population pressure, we have tried the growth of the rural population on arable land (to better capture population pressure on the poor in agriculture) as well as initial population densities and initial rural population densities on arable land. Besides the growth of the life expectancy, we have tried the change in the infant mortality rates, and the initial levels of both indicators. Besides the average years of schooling completed, we have tried the percent of students completing primary school and the ratio of female to overall years of education. None of these alternative measures are significantly correlated with income growth of the poor once overall growth is included (none of these results are shown).

The variables that are robustly correlated with the income growth of the poor are overall growth and (inversely) the initial income share of the poor. Controlling for these variables, population

[10] The five-year data of the United Nations (1996) and Barro and Lee (1993) were converted to annual data by linear interpolation when the years did not match the poverty data.

[11] Changes in population, health, and education are likely to be endogenously affected by economic growth (as in Pritchett and Summers, 1996, for heath), and these variables also affect economic growth (for health status, for example, see Barro, 1991). Since overall growth and these other variables are all independent regressors, though, these mutual paths of causation do not present econometric problems.

growth, and health and education improvements are not clearly correlated with the poor's income growth. Two clarifications are in order, though. First, this does not mean that the "social" variables do not affect the incomes of the poor, since factors like health and education are likely to contribute to overall economic growth. The impact of these variables on the poor may already be reflected in the effect of economic growth on the poor. Second, *average* health and education levels are not necessarily good measures of the health and education *of the poor*, which is what we would really like to measure.

A limitation of this analysis is our focus on income alone as a measure of the well-being of the poor. Factors like the health and education of the poor would provide important measures of the welfare of the poor independent of income, and need to be collected. The focus of our study is narrowed to income alone since the data are available. Our conjecture, though, is that making use of the alternative measures of welfare would not change our broad conclusions – that economic growth is crucial for improving the welfare of the poor, and that the poor benefit from economic growth as much as the overall population. These additional measures of the welfare of the poor are likely to be highly correlated with income levels just as we know that country averages of these measures are highly correlated with income levels (though there are some important exceptions). It is rare for countries to be able steadily to improve education and health of the poor in the absence of economic growth, and redistribution of education and health services away from the rich and towards the poor is just as rare and politically difficult as redistributing income and assets.

4. The Determinants of Growth of the Income of the Poor, Income Distribution, and Overall Growth

We now approach the issue from a different perspective. In the previous sections, we examined the direct relationship between aggregate economic growth and the growth of the incomes of the poor, and found that the incomes of the poor tend to increase at about the same rate as overall income in most countries. In this section, we explore individual factors that directly affect long-run economic growth – such as government policies, economic structure, and geography – and the extent to which these *also* directly affect long-run growth of the incomes of the poor. Do these factors affect aggregate income and the income of the poor in the same way? Or do some have a stronger or weaker effect on the incomes of the poor?

Our starting point for this investigation is the large body of research that has developed in recent years on the determinants of long-run economic growth across countries. This research explores the relationships between a variety of structural, geographical, policy, and demographic variables and growth in income per capita. Most studies have found strong relationships between economic growth and initial levels of income per capita (negatively associated with growth), savings rates (positively associated), openness to trade (positive), institutional quality (positive), health (positive), and levels of education (positive, although insignificant in many studies). Some studies include other variables, such as government spending patterns, natural resource abundance, geographical endowments (e.g., landlocked or located in the tropics), and demographic structure.[12]

We extend this research to explore how certain factors might differentially influence overall economic growth and the growth of the incomes of the poor. Does trade openness, for example, exert a stronger, weaker, or similar influence on economic growth and growth of the income of the poor? To the extent that the impact might be stronger (or weaker) for the poor, openness would then influence income distribution by being associated with an increase (or decrease) of the poor' s share of total income. We therefore can estimate the statistical relationship between a set of independent variables (e.g., policy and geography) and three related outcomes: economic growth, growth of the income of the poor, and changes in the poor' s share of total income.

The Neoclassical Model of Economic Growth

To pursue this approach, we first need to take a short detour into the intuition behind most current models of economic growth. In the basic neoclassical growth model, based on the seminal work of Solow (1956), a country' s growth rate is determined by the difference between its *current* level of income and its long-run *potential* level of income. If a country has nearly reached its full potential, there is little room for further economic expansion, and per capita growth rates will be very low or even zero. In other words, as average income rises closer to the long-run potential level, growth rates tend to slow. (Growth does not necessarily stop in the model, but can continue through technological change, which has the effect of continuously raising the long-run potential level of income). At the other extreme, a country that is operating well below its potential level of income has the capacity to substantially increase its output, and thus grow quickly.

Policy, geography, and other factors, in turn, influence a country' s long-run potential income. Favorable changes in these factors improve a country' s long-term potential level of income, and therefore its current growth rate. For example, if two countries currently have the same level of income, the one with the better-educated workforce would presumably have a higher potential level of income, and therefore would be expected to grow faster. A landlocked, remote country in the middle of the Sahara desert would have a much lower long-run potential income than a country on the coast with milder climactic conditions. The standard method of exploring these relationships is to estimate an equation of the following form:

$$y_i = a_0 + a_1 \mathrm{Y}_i + a_2 \mathrm{Z}_{1i} + a_3 \mathrm{Z}_{2i} + \ldots + a_{n+1} \mathrm{Z}_{ni} + u_i \qquad (2)$$

In this equation, y_i is the instantaneous growth rate of per capita income in country i, Y_i is the initial level of income per person, and Z_{1i}, Z_{2i}, . . . , Z_{ni} are a series of variables that collectively determine the long-run potential level of income. The set of Z variables, described in more detail below, includes government policies, levels of schooling, and geographical attributes. We explicitly include, as one of the Z' s, the initial share of income of the poorest quintile in order to

12 Some of the key papers in this body of research are Barro (1991); Barro and Lee (1994); Mankiw, Romer and Weil (1992); Sachs and Warner (1995a and 1995b); Radelet, Sachs, and Lee (1997); Barro and Sala-i-Martin (1995); Hall and Jones (1997); and Baumol and Wolff (1994).

further explore the relationship between income distribution and growth. The estimated constant term is a_0 and u_i is the error term.

We extend this relatively standard economic growth analysis by estimating two additional equations with similar form in which the dependent variables are the growth rate of the incomes of the poor, and the growth rate of the share of income of the poorest quintile, as follows:

$$p_i = b_0 + b_1 Y_i + b_2 Z_{1i} + b_3 Z_{2i} + \ldots + b_{n+1} Z_{ni} + w_i \qquad (3)$$

$$s_i = g_0 + g_1 Y_i + g_2 Z_{1i} + g_3 Z_{2i} + \ldots + g_{n+1} Z_{ni} + s_i \qquad (4)$$

In these equations, p_i and s_i are the instantaneous growth rates of the average income of the poorest quintile, and of the share of income of the poorest quintile in country i, respectively. Note that the independent variables on the right hand side of each of equations 2-4 are identical. When these three equations are estimated in this way, there is a direct relationship between the estimated coefficients for each of the independent variable across the equations. Recall from equation 1 that the dependent variables of these three equations are linked by an identity that says the growth of the incomes of the poor will be exactly equal to the sum of the growth rate of the poor' s share of total income and the overall rate of economic growth. By substituting the right-hand sides of equations 2-4 into equation 1 and simplifying the resulting expression, it can be shown the estimated coefficients for initial income and each Z variable for the three equations are related in the following way:

$$b_j = a_j + g_j \qquad \textbf{(5)}$$

That is, for each of the independent variables, the sum of the estimated coefficients in equation 2 and 4 should be exactly equal to the estimated coefficient in equation 3.[13] In this way, we are able to systematically estimate how each of the Z' s may affect overall economic growth, the growth of the income of the poor, and the share of income of the poorest quintile.

Estimation Results

With our focus on long-run growth in per capita incomes and the incomes of the poor, we use the long panel of data described earlier in the paper. Thus, the data set includes one observation per country, corresponding to the long term trend growth rates of income. Of the 60 countries listed

[13] Equations (2) – (4) can be represented in matrix form as:

$$p = Xb + w$$

$$y = Xa + u$$

$$s = Xg + s$$

According to Equation (1), $p = y + g$, so $X(b - a - g) = w - u - s$. Since this should be true in general, not just for a particular set of data, we take the expectation conditional on X: $E[X(b - a - g) | X] = E[w - u - s | X] = 0$, since the error terms are mean zero by assumption. Hence $b = a + l$. The OLS estimates b, a, and c of b, a, and g automatically fulfill this restriction. $b = (X'X)^{-1} X'p, a = (X'X)^{-1} X'y,$ and $c = (X'X)^{-1} X's$, so $b - a - c = (X'X)^{-1} X'(p - y - s) = 0$ by Equation (1).

in Table 1, all of the right-hand side variables needed to estimate equations 2-4 were available for 54 of these countries (the six excluded countries are marked with an asterisk in the last column of table 1).

The results of estimating equations 2 through 4 for a common set of Z variables are shown in table 6. Column 1 shows the results of estimating equation 2, with growth of per capita income as the dependent variable. Column 2 estimates the relationship with the growth of the income of the poor as the dependent variable (equation 3), and column three shows the results of estimating equation 4 with the growth rate of the share of the income of the poor on the left-hand side.

Initial Income. One of the key implications of the neoclassical growth model is that, all else being equal, poorer countries should grow faster than richer countries. For example, if two countries have the same long-run potential level of income, the country with lower current income should grow faster than the richer country. Poor countries tend to have a smaller capital stock (i.e., fewer machines, factories, and roads) than rich countries. Since capital is relatively scarce, the rate of return on new investments tends to be higher, leading to faster growth. Poor countries also have the advantage of being able to borrow new technologies and best management practices from richer countries without paying the costs of research and development. This idea has a powerful implication. If poorer countries grow faster, their income levels should begin to catch-up (or converge) with richer countries over time. Many growth studies have shown that once differences in other important structural and policy variables are taken into account, poor countries do, in fact, tend to grow faster than rich countries (e.g. Barro, 1991; Sachs and Warner, 1995a). This outcome is known as *conditional convergence*, since the income levels of countries converge over time, conditional on having similar policies, resource endowments, etc.

Given the close relationship between per capita growth and growth of the income of the poor, we similarly expect that the lower the initial average income of a country, the faster the subsequent growth rate of the income of the poor. All else being equal, we would expect that the greater rates of return on investment in low-income countries would be reflected in high growth rates for the income of the poor as well as overall income.

The results verify these expectations. The estimated coefficient on the log of initial income on overall economic growth (column one) is -2.5, with a t-statistic of 5.9. The estimated coefficient implies that if per capita income is half the level in one country as in another, the subsequent growth rate in the poorer country will be 1.7 percentage points faster per year.[14] The effect of initial income is very similar on the growth rate of the income of the poor, as shown in column 2. In this case, the estimated coefficient is -3.3, with a t-statistic of 4.96. As expected, the negative coefficients in both cases imply that the lower the average income of a country, the faster the subsequent growth rate of per capita income, and of the income of the poor.

If the estimated coefficients on initial income in columns one and two were significantly different from each other, it would further imply that initial income levels were somehow associated with changes in the share of the income of the poor. In fact, the estimated coefficients are not significantly different from each other. This is shown in column three, where the left-hand-side variable is the annual growth rate of the share of income of the poorest quintile. The estimated coefficient on initial income is –0.87, but is not statistically different from zero. Therefore, initial income levels are not associated with changes in the share of income of the poor. (Note that, as expected, the sum of the estimated coefficients in columns one and three (-2.461 + - 0.868) is exactly equal to the estimated coefficient in column two (-3.329), a relationship that holds for all of the estimated coefficients described below).

[14] This result is obtained by multiplying the estimated coefficient on initial income by the log of one-half: -2.461 * ln (½) = 1.71.

Initial Income Distribution. Does the initial distribution of income directly affect either overall economic growth, or the growth of income of the poor? We test this hypothesis by including the initial share of the income of the poorest quintile as one of the independent variables. The results in column one indicate that initial income distribution is not related to subsequent overall economic growth. The estimated coefficient of -0.08 is not statistically different from zero.

However, we find a very strong relationship between initial income distribution and the subsequent growth of the income of the poor, The estimated coefficient on the initial distribution is –0.626, with a t-statistic of 4.2, indicating significance at the one-percent level. The estimated coefficient implies an increase of one percentage point in the initial share of the income of the poorest quintile is associated with a 0.6 percentage point increase in the subsequent growth rate of the income of the poor.

Taken together, the results in columns 1 and 2 imply that in countries with initially poor distribution of income, distribution tends to improve; conversely, in countries with more favorable initial distribution of income, distribution tends to get worse. This result is shown statistically in column three. The estimated coefficient on initial income distribution is –0.55, and is highly statistically significant. These results are consistent with the results reported in section 3, where we controlled for the overall rate of growth of per capita income. Our results here show that the negative coefficient on initial income distributions holds even after controlling for all of the other Z variables listed in Table 5.

Initial Levels of Education and Health. Human capital, measured in terms of levels of education and health, is often suggested as a possible source of growth. A better-educated or healthier workforce is likely to be able to produce more from a given resource base than less-skilled workers. We examined education and health in turn. Our main measure of education is the average years of education of the adult population (drawn from Barro and Lee, 1993).To focus how education levels affect subsequent growth, we examine the average years of schooling in the initial year for each country. We are unable to find a statistically significant relationship between initial levels of education and subsequent economic growth in our sample of countries.[15] This result is consistent with other studies that have found a weak direct link between education and growth (e.g., Pritchett, 1996). Somewhat more surprisingly, we were also unable to find a statistically significant relationship between education levels and growth of the income of the poor. One possible explanation is measurement problems. For example, available data do not make any adjustment for the quality of schooling, which arguably is a key determinant of human capital accumulation.

We obtained a much stronger relationship between initial levels of health and economic growth in this sample of countries (again consistent with previous studies, such as Barro, 1991 and Radelet et al., 1997). Our basic measure of overall health of the population is life expectancy at birth, measured in the initial year of observation in each country (drawn from United Nations (1996) data). We find that an increase in life expectancy of one year is associated with a 0.09 percentage point increase in subsequent growth in per capita income (column 1). The estimated coefficient is significant at the five-percent level. With respect to the growth of the incomes of

[15] We explored several other measures of educational attainment (e.g., school completion rates, enrollment rates, literacy rates) and found similar results.

the poor (column 2), the results are similar, andsomewhat stronger. In this case, each one-year increase in life expectancy is associated with a 0.16 percentage point increase in subsequent growth in the income of the poor. Although this estimated coefficient is slightly larger than for per capita growth, the difference is not statistically significant. Thus, column three shows that although there is a positive correlation between life expectancy and improved income distribution, the relationship is not significant at conventional levels. The results suggest that improved health is associated with faster overall economic growth, and with more rapid growth of the incomes of the poor.

Geography: Few cross-country growth studies take geography into account, but those that do have found strong results (Gallup, Sachs, and Mellinger, 1998; Radelet, Sachs, and Lee 1997; Sachs and Warner 1998; Hall and Jones 1997). In particular, countries located in the tropics tend to grow more slowly than countries in more temperate climates. Very few tropical countries have achieved sustained economic growth and high levels of income. Although the precise reasons for this negative relationship are unclear, two channels seem possible. First, tropical countries face a wide variety of parasitic diseases that are much less prevalent in the temperate zones. Second, soils tend to be more fragile, rains less reliable, and natural disasters more prevalent, all of which may make sustained agricultural growth more difficult in the tropics.

We find that growth of per capita income was about 1.3 percentage points slower for countries in the tropics than for countries in more temperate climates. The association was significant at the five percent level. With respect to the growth of the income of the poor, the impact was more than twice as large, with the growth rate of the income of the poor in tropical countries 3.0 percentage points slower than for the poor in more temperate climates. In this case, the*t*-statistic is 3.8, implying that the estimated coefficient is significant at better than the one percent level. These results suggest that the negative impact of tropical climates is larger for the poorest segments of the population. The poor are more vulnerable to parasitic diseases, since they tend to have poorer nutrition, sanitation, housing quality, and less access to medical care and clean water. The poor are also more handicapped than the rich by the difficulties facing tropical agriculture, since a greater share of the poor work in that sector. By contrast, richerpeople tend to work in manufacturing or service jobs, which are less affected by the natural environment (for example, many factories and office buildings are air-conditioned). These circumstances would shield richer workers from many of the difficulties associated with being in the tropics.[16]

A second geographical obstacle facing many countries is access to major shipping lanes and important markets. Landlocked countries are likely to be especially penalized in this way. For any given export (or import) product, landlocked countries generally must pay higher shipping costs, which would result in lower payments to labor, lower returns on capital, less investment, and slower growth. Landlocked countries must pay road transport costs across at least one international boundary in addition to sea freight costs, as well as face more shipping delays. A recent UNCTAD study found that landlocked countries in sub-Saharan Africa paid between 30% and 100% more in shipping costs than adjacent neighbors with direct access to the sea (UNCTAD, 1996). Although air shipments can help overcome many of these problems, only certain goods can be economically shipped by air, and most countries still import and export the majority of goods by the sea. The negative impacts of isolation may be particularly acute for the

[16] For more discussion of these issues, see Gallup, Sachs, and Mellinger, 1998.

poor, since it may undercut a country s ability to compete in low-skilled, labor abundant manufactures. After all, Reebok is very unlikely to ever build a factory in Mongolia, Bolivia, or Rwanda, since shipping costs would be so much higher in those countries than for coastal economies. Radelet and Sachs (1998) show that shipping costs are strongly and negatively associated with manufactured exports, as well as with overall economic growth.

Our results indicate that growth in per capita income in landlocked countries has been about 2.1 percentage points lower than in coastal economies, after controlling for all the other variables. The result is significant at the five percent level. With respect to the growth rate of the income of the poor, the estimated coefficient is smaller and is not statistically significant. The difference in these two estimated coefficients is not statistically significant, as shown in the results in column three of table 6, implying that being landlocked is not associated with changes in income distribution.

Government Policies. We explore the relationship between three basic government policies -- openness to the global economy, government saving, and the composition of government expenditures -- and growth of per capita income, growth of the income of the poor, and changes in income distribution. First, we would expect that countries that have been consistently open to the global economy would record faster growth than closed economies. Open economies are likely to grow faster because they will tend to have a greater division of labor and production processes that are more consistent with their comparative advantage. In addition, open economies are in a better position to import new technologies and new ideas from the rest of the world. In addition, the poor are likely to obtain important benefits from openness, through greater employment opportunities for low-wage unskilled labor.

To test these relationships, we use the openness measure derived by Sachs and Warner (1995), which classifies a country as open if (i) import duties average less than 40%, (ii) less than 40% of imports are covered by quotas, (iii) the black market premium on the exchange rate is less than 20%, and (iv) export taxes are moderate. A country is considered to be open, and therefore assigned an index value of 1, in each year that it meets all four criteria. For the full time period, the index measures the share of years that a country is considered open. Thus for each country, the openness index is a number between 0 and 1.

The results strongly indicate that growth in both per capita income and the income of the poor has been much faster in open economies than in closed economies. With respect to per capita income, the estimated coefficient of 2.7 indicates that in countries that were completely open during the period (openness index = 1), per capita income grew 2.7 percentage points faster per year than in countries that were completely closed (openness index = 0). The t-statistic of 5.9 indicates a very strong relationship, significant at well below the one-percent level. The estimated coefficient is slightly larger (2.96) for the growth rate of the incomes of the poor, and is also significant at better than the one-percent level. However, the difference between the estimated coefficients for openness in columns one and two is not statistically significant, as shown in column three. The results in this column show that the estimated coefficient between openness and income distribution is positive, but is insignificant.

These findings indicate that open economies enjoy much faster growth, and that the growth is distributed fairly well throughout different income groups. There is no evidence from these results to suggest that the process of global integration leaves behind the poor (if anything, they are mildly suggestive of the opposite effect). Openness to the global economy appears to have had a powerful effect on reducing poverty across countries.

A second important policy is the average central government saving rate, defined as the surplus of current government revenue over current government expenditures.[17] We measure this variable as a share of GDP, and take an average over the period. There are two channels through which higher government saving is likely to support aggregate economic growth and the growth of the incomes of the poor. First, countries with higher rates of government savings tend to have greater overall savings and investment, and therefore faster growth. Second, higher government saving tends to be indicative of sound overall macroeconomic management, including lower aggregate budget deficits, more prudent monetary policies, and lower inflation. Macroeconomic stability, in turn, lowers the risks for investors and increases investment. The poor are likely to be hit hardest by high inflation and macroeconomic instability, since they are probably the first to lose their jobs in economic downswings and are the least able to diversify their risks.

We find a strong positive relationship between government saving and the growth of per capita income (column one of table 6). The estimated coefficient of 0.29 (t=7.0) implies that each one percentage point increase in the government saving rate is associated with an increase of about 0.3 percentage points in the growth rate of per capita income. The estimated coefficient for growth of the income of the poor is substantially larger, at 0.45 (t=6.9), suggesting that government savings is especially important for the poor. Taken together, the results in columns one and two suggest that higher government savings are associated with growth in the income of the poor at rates even faster than overall per capita income, and therefore with an improvement in the distribution of income. This result is verified in column three. Each one-percentage point increase in the rate of government savings is associated with a 0.17 percentage point increase in the rate of growth of the share of the income of the poor. The t-statistic of 2.75 indicates that this result is significant at the five-percent level. Prudent government fiscal policies appear to be associated with fast overall economic growth, even faster growth of the income of the poor, and improved distribution of income.

The third policy we examined is the *composition* of government spending. In particular, we examine the extent to which government expenditures on health and education may be associated with economic growth, the incomes of the poor, and income distribution. Public spending on health and education might be of particular importance to the poor, who may have limited access to private education and health facilities, and may be unable to pay full market prices for these services. We found a positive relationship between government spending on health and education (measured as a share of GDP) and growth of per capita income. The estimated coefficient of 1.1 indicates that a one-percentage point increase in spending in these areas is associated with a 1.1 percentage point increase in the growth rate. However, the standard error

[17] Current government spending (and revenues) excludes expenditures (and associated revenues) on investment projects. The logic is that the surplus on the current budget (savings) finances investment expenditures.

of the estimated coefficient is relatively large, so that the relationship is not statistically significant.

Turning to the growth of the income of the poor, the estimated coefficient is larger (2.9) and is significant at the six-percent level. This result suggests that each percentage point increase in government spending on health and education is associated with an increase of about three-percentage points in the growth rate of the income of the poor. Since public spending on health and education is associated more strongly with growth of the incomes of the poor than with overall growth, it is possible that such spending is related to an improvement in distribution. The results in column three show that spending on health and education is indeed positively associated with growth in the share of income of the poor, but the estimated coefficient is not significant at conventional levels. Thus, the results are mildly suggestive, but not conclusive, of an association between spending on health and education and improved income distribution.

We note that if the central government saving variable is dropped from the regression, the positive relationship between education and health expenditures and income growth of the poor disappears (results not shown). This suggests that the increased spending on health and education must take place in the context of an overall prudent fiscal stance, not through a larger fiscal deficit. Overall, the results indicate that government spending on health and education programs, in the context of a stable macroeconomic framework, are supportive of income growth of the poor, and perhaps of improved distribution.

A wide range of other government policies could potentially affect overall growth and the incomes of the poor. Some policies, like monetary growth, are highly correlated with openness and central government savings, so their impact is to a large extent captured by these variables. It would be nearly impossible for a country to maintain consistently open trade policies and high government savings without also maintaining prudent monetary policies. Similarly, the openness index itself is a composite of four government policies, including a measure of exchange rate management. In other words, the openness index and central government savings probably capture the effects of a wider range of policies that influence overall macroeconomic stability. Other government policies that may be important to the poor, such as micro-credit programs or commodity price stabilization schemes, simply cannot be measured consistently across countries and examined in this type of framework. Thus, while this framework does not capture all of the policies that might help the poor, it does point to the fundamental importance of trade openness, appropriate exchange rate management and prudent government budgetary policies in supporting overall economic growth and the growth of the income of the poor.

Political Instability. Finally, we find a strong negative relationship between political instability and economic growth, especially for the poorest quintile. Our measure of political instability is taken from Barro and Lee (1994), and is based on the number of assassinations per million people per year, and the number of attempted coups per year. The three highest values are for Guatemala (0.43), El Salvador (0.41), and the Philippines (0.22).

We find that political instability is a large and statistically significant deterrent to economic growth. In particular, an increase in the political instability index from zero to one is associated with a 5.9 percentage point decline in the growth rate of per capita income. The result is highly statistically significant. The results are even stronger for the growth of the income of the poor. The estimated coefficient indicates that a change in the index from zero to one is associated with a remarkable 15-percentage point decline in the growth rate of the income of the poor. For a slightly more concrete example, consider the impact of a country moving from an index of 0.05 (the value for India) to 0.15 (the value for Jordan). The results indicate that the increased instability in Jordan would be associated with a 0.6 percentage point fall in overall economic growth, and a 1.5 percentage point drop in the annual growth rate of the income of the poor.

Since the impact of political instability is larger for the growth of the income of the poor than for overall economic growth, it follows that political instability would adversely affect the distribution of income. This outcome is verified in the results shown in column three of table 6. An increase in political instability is stronger associated with a decrease in the share of income of the poorest quintile of the population. A change in the index from zero to one is associated with a fall of 9.4 percentage points in the growth rate of the poor' s income share. The *t*-statistic (3.1) indicates that the result is significant at the one-percent level.

These results suggest that the consequences for political instability are most severe for the poor. The poor, for example, may be less able to protect their safety and property or keep their jobs during periods of political strife. Unrest may choke off domestic transport, cutting off rural dwellers from the rest of the economy. Richer individuals may be better able to weather instability by relying on accumulated assets. Political instability undermines overall economic growth, but is particularly detrimental to the income of the poor, and therefore has a negative impact on income distribution.

5. Conclusions

This analysis is an initial attempt to examine the factors associated with growth in the incomes of the poor across countries. Obviously, this line of research itself does not completely explain the process of income growth of the poor, nor does it fully identify the precise channels through which various factors operate. We are not able to address broader measures of poverty besides the income of the poor, such as the health and education status of the poor, although they are likely to be highly correlated with income levels.

The most important conclusion is that aggregate economic growth is highly correlated with the incomes of the poor, and this relationship is *one-for-one*. On average across countries, one percent higher average income *levels* corresponds to one percent higher income levels of the poor, and one percent higher *growth* in average income corresponds to one percent higher growth of income of the poor, both in the long term and in the short term. While there are some countries in which the incomes of the poor grow more slowly, there are an equal number in which the incomes of the poor grow even faster than overall growth.

Several factors appear to have a strong *direct* effect on the rate of growth of the income of the poor, regardless of the overall rate of economic growth. The income of the poor tends to grow faster in countries that have a lower level of initial income and in countries with a healthier population. Faster income growth for the poor is also recorded in countries located in temperate (rather than tropical) climates, suggesting that the poor face especially difficult challenges in tropical countries. In addition, the incomes of the poor tend to grow rapidly in countries that are open to the global economy and have higher government savings rates. These policies provide a stable environment for investment and job creation, providing the poor with the opportunity for income growth. Foreign trade openness is just as good for the incomes of the poor, on average, as for the rest of the population. We found moderately strong evidence that higher government spending on education and health supports income growth of the poor, provided it is undertaken within a prudent fiscal stance and not through larger budget deficits. We also found that political instability is strongly detrimental to the growth of the income of the poor.

Turning to income distribution, the finding that the income of the poor tends to grow just as fast as average income implies that the income distribution tends to remain unchanged as incomes grow. It is heartening that the poor do not fall behind during rapid growth; it is disappointing that income distribution does not systematically improve with growth. However, while this overall tendency remains, there are some countries in which the income of the poor grows faster than overall income (i.e., distribution improves) and others in which the income of the poor lags behind the average (i.e., distribution worsens). We find a general tendency for distribution to become more similar across countries. In other words, countries with initially less equal distribution recorded higher income growth for the poor than for the average, making income distribution improve, and countries with a more favorable initial distribution had lower income growth for the poor than for the average, making income distribution deteriorate. This resultis robust with different samples of countries and time periods and after controlling for a range of other variables, though it is weakened by controlling for possible measurement error.

We did not detect any relationship between education, health, or population growth on income distribution. We did not find evidence that existing health, education, or population programs specially benefit the poor, over above how they affect overall economic growth. It is possible that improvements in the health and education *of the poor* relative to the rest of the population would disproportionately raise the incomes of the poor, but data limitations preclude us from testing this possibility.

Finally, economic and political stability are especially good for the income of the poor, and thus are strongly associated with improved income distribution. Countries with higher levels of government savings – which we take as a proxy for prudent macroeconomic management more generally – record faster economic growth, but even faster growth for the income of the poor, and thus improved distribution. The opposite is true for political instability. Political instability (as measured by the number of coups and assassinations) hurts everyone, but has a much larger adverse affect on the income growth of the poor than it does on overall income growth. Countries with more stable political situations have recorded substantially faster growth rates of the income of the poor and thus improved income distribution, relative to politically unstable countries.

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Table 1. Income Growth and Income Distribution

	Country	Year of Observation		Trend Annual Growth Rates of Income (%)			Initial Share of Income of Poorest Quintile (%)	Countries Not in Section 4 (*)
		First	Last	Poorest Quintile	Whole Population	Difference		
I. Income Growth of the Poorest Quintile Exceeds Overall Income Growth								
1	Trinidad	1971	1981	10.4	4.7	5.7	2.0	
2	Honduras	1968	1992	4.2	0.6	3.6	1.6	
3	Turkey	1968	1987	5.5	2.5	2.9	3.0	
4	Zambia	1976	1991	-0.7	-3.5	2.7	3.7	
5	Jamaica	1975	1993	1.6	-1.0	2.6	4.0	
6	Puerto Rico	1969	1989	4.7	2.3	2.4	1.9	*
7	Philippines	1965	1994	3.0	1.0	1.9	3.4	
8	Mexico	1968	1992	3.5	1.8	1.7	2.6	
9	Sweden	1967	1992	3.2	1.6	1.6	5.3	
10	Jordan	1980	1991	-0.7	-1.9	1.3	6.0	
11	Italy	1977	1991	3.3	2.2	1.0	7.4	
12	Malaysia	1970	1989	5.3	4.3	1.0	3.6	
13	Norway	1967	1991	4.1	3.1	1.0	5.0	
14	France	1979	1989	2.3	1.6	0.7	6.6	
15	Yugoslavia	1978	1990	-0.4	-1.0	0.7	6.7	*
16	Indonesia	1976	1995	5.2	4.5	0.7	7.7	
17	Germany	1969	1989	2.6	2.0	0.6	6.7	
18	Czechoslovakia	1965	1988	4.0	3.4	0.6	10.3	*
19	Panama	1970	1989	1.0	0.4	0.6	2.6	
20	Bangladesh	1967	1992	2.2	1.7	0.5	7.0	
II. Income Growth of the Poorest Quintile is Roughly Equal to Overall Income Growth								
21	Hong Kong	1971	1991	6.1	5.8	0.4	5.1	
22	Brazil	1970	1989	2.9	2.5	0.3	2.7	
23	Belgium	1979	1992	2.1	1.8	0.3	8.1	
24	Canada	1965	1994	2.7	2.5	0.2	6.7	
25	Japan	1965	1982	4.6	4.4	0.2	6.0	
26	Ireland	1973	1987	2.3	2.1	0.2	4.8	
27	India	1965	1994	2.6	2.4	0.2	8.6	
28	Tunisia	1965	1990	3.5	3.4	0.1	5.7	
29	Finland	1966	1991	2.9	2.8	0.1	6.9	
30	Sri Lanka	1970	1990	2.9	2.9	0.0	6.6	
31	Venezuela	1971	1990	-1.8	-1.7	0.0	4.6	
32	Greece	1974	1988	1.6	1.9	-0.2	6.6	
33	Korea, R.	1965	1988	6.6	6.9	-0.3	7.0	
34	Spain	1980	1990	2.3	2.7	-0.4	9.0	
35	Pakistan	1969	1991	1.3	1.7	-0.4	9.1	
36	Costa Rica	1971	1989	0.0	0.4	-0.4	4.1	
37	Taiwan	1966	1990	5.8	6.3	-0.5	9.0	
III. Income Growth of the Poorest Quintile is Less Than Overall Income Growth								
38	Soviet Union	1980	1989	2.1	2.7	-0.6	9.6	
39	Mauritius	1980	1991	3.0	3.6	-0.6	6.8	
40	Singapore	1978	1988	4.2	4.9	-0.7	6.9	
41	USA	1965	1994	0.8	1.6	-0.8	5.7	
42	Hungary	1972	1993	0.2	1.1	-0.9	11.0	
43	UK	1965	1991	1.2	2.0	-0.9	10.6	
44	Chile	1968	1994	0.3	1.2	-0.9	4.5	
45	Bulgaria	1980	1993	1.8	2.8	-1.0	10.6	
46	Bahamas	1979	1993	-1.3	-0.2	-1.1	3.8	*
47	Australia	1969	1990	0.4	1.6	-1.3	6.0	
48	Thailand	1969	1992	3.1	4.4	-1.3	5.2	
49	Poland	1976	1993	-2.5	-1.1	-1.4	10.8	
50	Netherlands	1975	1991	-0.2	1.3	-1.5	9.0	
51	Portugal	1973	1991	1.6	3.2	-1.6	7.5	
52	New Zealand	1973	1990	-0.7	0.9	-1.6	6.8	
53	Nepal	1984	1995	0.5	2.1	-1.6	9.1	*
54	El Salvador	1977	1995	-2.1	-0.4	-1.7	5.0	
55	Colombia	1970	1994	0.2	2.0	-1.8	4.8	
56	Denmark	1976	1992	-0.1	1.8	-1.8	7.0	
57	Peru	1981	1994	-3.8	-1.9	-1.9	6.3	
58	China	1980	1995	1.0	4.4	-3.4	9.3	
59	Sierra Leone	1968	1989	-5.7	-0.8	-4.8	2.8	
60	Guatemala	1979	1989	-11.9	-2.1	-9.8	5.7	

Table 2: Income Growth and Income Shares of the Poor by Region

Regions	Number of Countries	Income growth of poor (%)	Average income growth (%)	Difference of poor - average (%)
East and Southeast Asia	10	4.5	4.7	-0.2
Middle East and North Africa	3	2.8	1.3	1.5
Western Europe	14	2.1	2.1	0.0
South Asia	5	1.9	2.2	-0.3
Transition economies	6	0.9	1.3	-0.4
Latin America	15	0.5	0.6	-0.1
Sub-Saharan Africa	3	-1.1	-0.2	-0.9
Other	4	0.8	1.6	-0.8
Total	60	1.8	1.9	-0.1

Table 3: Growth of the Income of the Poor and Average Income in the Long Run

	(1) Growth of the Income of the Poor	(2) Growth of the Income of the Poor	(3) Low Income Economies Only
Growth of GDP p.c.	1.164	1.240	1.326
	(6.08)**	(6.70)**	(5.83)**
Initial Quintile Share		-0.337	-0.573
		(3.41)**	(3.28)**
Constant	-0.469	1.479	2.287
	(0.85)	(1.75)	(2.46)*
Observations	60	60	35
R^2	0.59	0.65	0.67

Robust *t*-statistics in parentheses

* significant at 5% level; ** significant at 1% level

Table 4: Growth of the Income of the Poor and Average Income in the Short Run

	(1) Growth of the Income of the Poor	(2) Fixed Effects Estimates	(3) Instumental Variables Estimates
Growth of GDP p.c.	1.092	1.085	1.112
	(11.27)**	(10.30)**	(11.35)**
Initial Quintile Share	-0.461	-4.210	-0.262
	(3.53)**	(8.95)**	(1.90)
Constant	2.168	27.818	0.825
	(2.16)*	(8.57)**	(0.77)
Observations	488	488	419
R^2	0.23		0.24

Robust cluster *t*-statistics in parentheses for (1) and (3); (2) has regular *t*-statistics

* significant at 5% level; ** significant at 1% level

Table 5: Growth of the Income of the Poor and Population, Health, and Education in Long Run

	Growth of the Income of the Poor
Growth of GDP p.c. (%)	1.247
	(7.14)**
Initial Quintile Share (%)	-0.492
	(2.79)**
Population Growth (%)	-0.193
	(0.40)
Growth of Life Expectancy (%)	-2.758
	(1.60)
Growth of Avg. Years of Education (%)	-0.638
	(0.66)
Growth of Avg. Years of Female Education (%)	0.749
	(1.08)
Constant	3.500
	(2.21)*
Observations	58
R^2	0.69

Robust *t*-statistics in parentheses
* significant at 5% level; ** significant at 1% level

Table 6. Economic Growth, The Income of the Poor, and Income Distribution

	(1) Growth Rate of GDP per capita, Whole Population	(2) Growth Rate of Income of the Poorest Quintile	(3) Growth Rate of Income Share of the Poorest Quintile
Initial per capita Income (log)	-2.461	-3.329	-0.868
	(5.89)***	(4.96)***	(1.42)
Initial Income Share of the Poorest Quintile (%)	-0.075	-0.626	-0.551
	(0.82)	(4.24)***	(4.09)***
Average Years of Schooling in 15+ Age Group	0.060	-0.093	-0.153
	(0.51)	(0.49)	(0.89)
Initial Life Expectancy (years)	0.090	0.159	0.069
	(2.33)**	(2.56)**	(1.22)
Tropical Location (% of land area)	-1.301	-3.044	-1.743
	(2.61)**	(3.80)***	(2.39)**
Landlocked	-2.080	-0.133	1.947
	(2.26)**	(0.09)	(1.45)
Openness (0-1)	2.703	2.955	0.253
	(5.90)***	(4.01)***	(0.38)
Central Government Savings Rate (%)	0.288	0.454	0.166
	(7.00)***	(6.86)***	(2.75)***
Public Expenditure on Health and Education (% of GDP)	1.131	2.859	1.728
	(1.23)	(1.93)*	(1.28)
Political Instability	-5.866	-15.310	-9.444
	(2.81)***	(4.56)***	(3.09)***
Constant	15.460	22.884	7.424
	(5.83)***	(5.38)***	(1.91)*
Observations	54	54	54
R^2	0.76	0.74	0.49

Absolute value of *t*-statistics in parentheses
* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Figure 1: Income of average vs. poorest

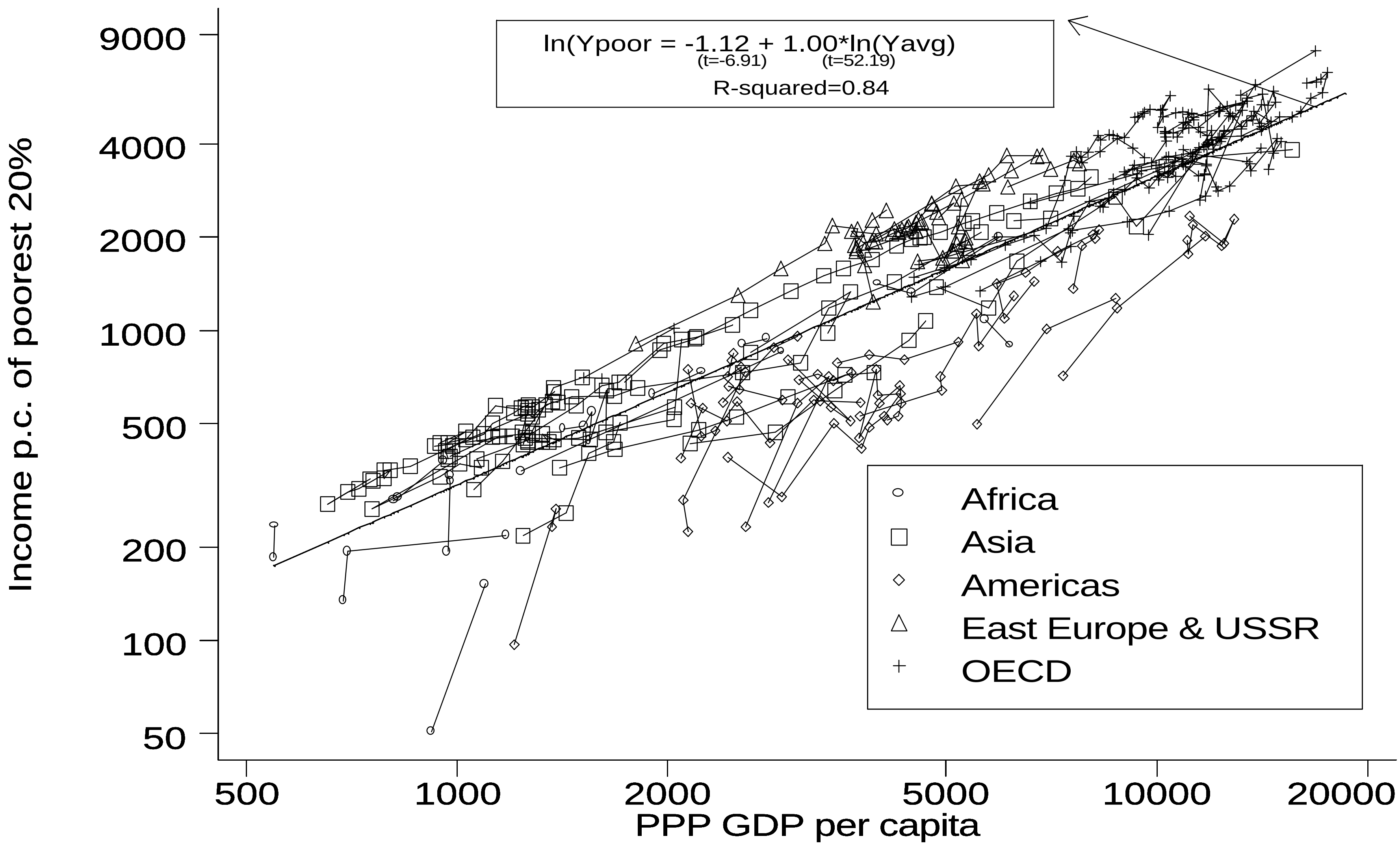

Figure 2: Growth of Average Income vs. Growth of Poor' s Income in Long Run

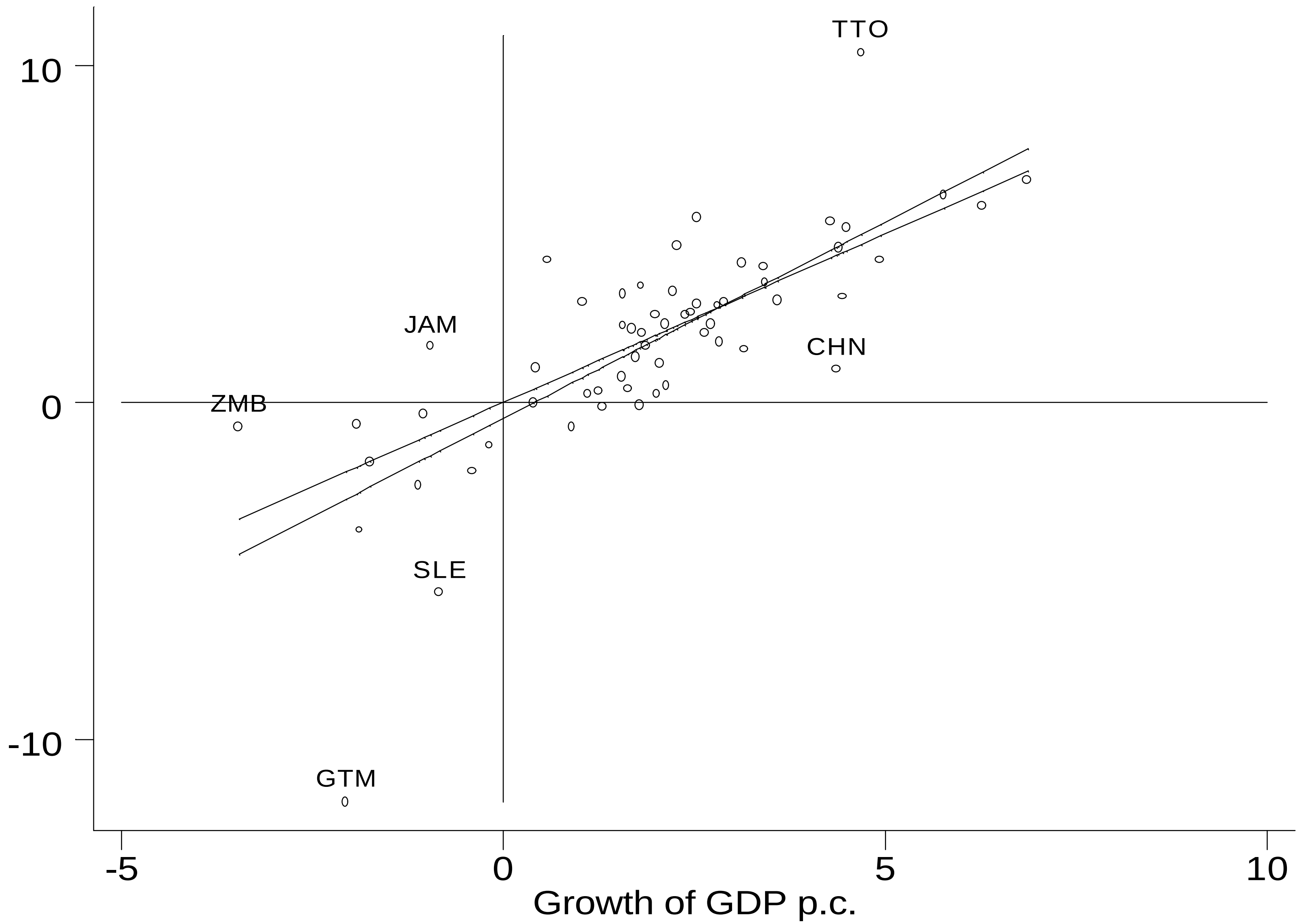

Figure 3: Growth of Average Income vs. Growth of Poor' s Income in Short Run